## **Corkscrew electrode**

Corkscrew electrodes (CS) are usually used for transcranial electrical stimulation (TES) in the intraoperative monitoring of motor evoked potential (MEP). Direct cranial stimulation with peg-screw (PS) electrodes can elicit MEP.

A study investigated the difference in the initial threshold between peg-screw and corkscrew electrodes in intraoperative MEP monitoring.

Kanaya et al., retrospectively analysed TES-MEP monitoring for supratentorial surgery in 72 patients. Of these, 44 patients were monitored with peg-screw and corkscrew (PS/CS) group and 28 patients were monitored with corkscrew and corkscrew (CS/CS) group. TES was used to deliver electrical stimulation by a train of 4 pulse anodal constant current stimulation (mA). The initial threshold (mA) in each electrode was checked and analysed.

In the PS/CS group, the initial threshold with the peg-screw electrode was  $38.3 \pm 15.1$  mA (mean  $\pm$  SD) on the affected side and the initial threshold with the corkscrew electrode was  $51.4 \pm 13.9$  mA on the unaffected side. The initial threshold with the peg-screw electrode was significantly lower than that with the corkscrew electrode (P = 0.0001). In the CS/CS group, the initial threshold was  $56.2 \pm 16.5$  mA on the affected side and  $62.1 \pm 18.6$  mA on the unaffected side, which showed no significant difference (P = 0.23).

The initial threshold to elicit MEP was significantly lower with the peg-screw electrode than with the corkscrew electrode. A peg-screw electrode can be used as a feasible stimulation electrode for TES-MEP  $^{1)}$ .

Ito et al., used surface electrodes of an endotracheal tube to record compound electromyographic responses from the vocalis muscle. Motor neurons were stimulated using corkscrew electrodes placed subdermally on the scalp at C3 and C4. During surgery, the operator received a warning when the amplitude of the vagal motor evoked potential (MEP) decreased to less than 50% of the control level. After surgery, swallowing function was assessed clinically using grading criteria.

In 5 patients, vagal MEP amplitude permanently deteriorated to less than 50% of the control level on the right side when meningiomas were dissected from the pons or basilar artery, or when a schwannoma was dissected from the vagal rootlets. These 5 patients had postoperative dysphagia. At 4 weeks after surgery, 2 patients still had dysphagia. In 2 patients, vagal MEPs of one side transiently disappeared when the tumors were dissected from the brainstem or the vagal rootlets. After surgery, both patients had dysphagia, which recovered in 4 weeks. In 7 patients, MEP amplitude was consistent, maintaining more than 50% of the control level throughout the operative procedures. After surgery all 7 patients were neurologically intact with normal swallowing function.

Vagal MEP monitoring with transcranial electrical stimulation and endotracheal tube electrode recording was a safe and effective method to provide continuous real-time information on the integrity of both the supranuclear and infranuclear vagal pathway. This method is useful to prevent intraoperative injury of the brainstem corticobulbar tract or the vagal rootlets and to avoid the postoperative dysphagia that is often associated with brainstem or skull base surgeries <sup>2)</sup>.

## Unclassified

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